

The Effect of the Hydro Dam  
on the  
Mayo River Fish Stocks

Report

by

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## INTRODUCTION

In 1954 a hydro-power dam was placed on the Mayo River. This structure poses a complete barrier to up stream migration of fish from the Stewart River. Chinook salmon that had spawned above the dam are now reported to spawn in small numbers below, in the short section of river between the Stewart River and the Dam.

The object of this study was to:

- (1) assess the situation created by the dam in order to insure the continued propagation of chinook salmon.
- (2) acquire information of other fish which inhabit this stream.

## METHODS

On June 13, 1972, the assessment program of the Mayo River began, using the public campground as a base camp.

Species composition was determined with the use of a 50' x 8' small mesh seine,  $2\frac{1}{2}$ " to  $4\frac{1}{2}$ " stretch mesh monofilament gill nets and a 4' x 4' double throat fyke net. The gill nets were set in various locations in the area of the public campground. The fyke net was set in mid stream across from the campsight. Seineing was done in various locations between the dam and the Stewart River and also in the Mayo River above the dam, at Roop River and at Duncan Creek. (Fig. #1)

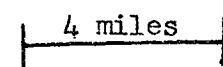
Transportation to the various sampling locations was provided by truck, helicopter and a 12 foot rubber raft - powered with a  $9\frac{1}{2}$  horsepower motor.

Species, length, weight and sex were recorded for most samples collected.

Physical characteristics were quantified using standard stream inventory techniques.

Dissolved oxygen and pH were taken using a Hach water chemistry kit. Daily temperatures were recorded in  $^{\circ}\text{F}$  using a small pocket thermometer.

Two local residents and the dam Supervisor were interviewed in order to gain information about the area and about the effects of the dam on the Mayo River.



X - seineing sights

## RESULTS

Species Composition

The species observed in the Mayo River between the dam and the Stewart River are presented below.

Common Name .	Scientific Name
1. chinook salmon (fry)	<u>Oncorhynchus tshawytscha</u>
2. arctic grayling	<u>Thymallus arcticus</u>
3. inconnu	<u>Stenodus leucichthys nelma</u>
4. lake whitefish(humpback)	<u>Coregonus clupeaformis</u>
5. round whitefish	<u>Prosopium cylindraceum</u>
6. lake trout	<u>Salvelinus namaycush</u>
7. longnose sucker	<u>Catostomus catostomus</u>
8. northern pike	<u>Esox lucius</u>
9. lake chub	<u>Couesius plumbeus</u>
10. slimy sculpin	<u>Cottus cognatus</u>

The longnose sucker was the most abundant fish taken in the gill nets. Many were mature and in spawning colours. Grayling and round whitefish were secondary in abundance.

Seineing produced large numbers of immature grayling and round whitefish as well as numerous chinook salmon fry. Fig. #2 gives the length frequency distribution of 36 chinook fry captured by seine during the study period.

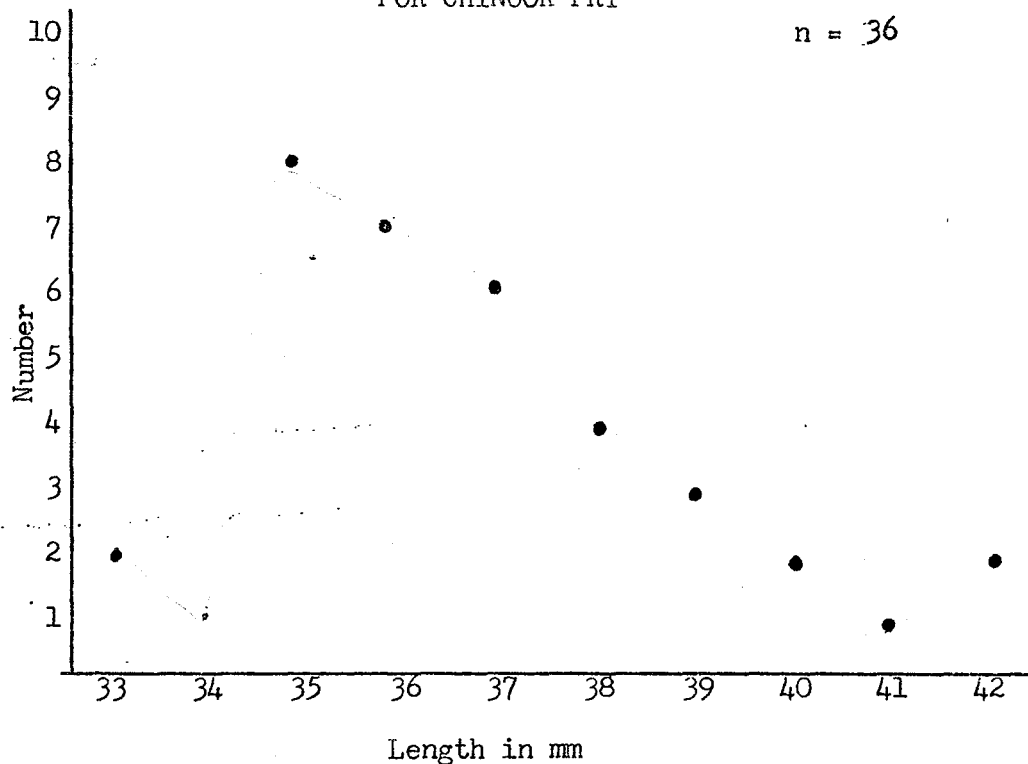
The length range of immature grayling taken was 75 mm to 158 mm with the heaviest concentration between 81 and 90 mm.

Lengths and weights of all fish sampled can be found in Fig. 3.

The results of the scale readings will be added after they have been processed at regional office.

Fig. #2

LENGTH FREQUENCY - JULY 1972  
FOR CHINOOK FRY



#### Physical Characteristics

The physical characteristics observed were similar to those by C. Walker and G. Jones in the report Shut-Off of Discharge at Mayo River Powerhouse, 1972.

#### Commensing at the mouth:

- 0.0 - 3.0 miles - generally riffle-pool  
80% coarse material with some fines, silt and sand.
- 3.0 - 4.5 miles - slightly steeper gradient  
90% coarse material.
- 4.5 - 5.5 miles - canyon area, bedrocks and boulder  
steepest gradient of stream.
- 5.5 - 7.0 miles - 90% boulder, lesser gradient than canyon area but  
greater than lower 4.5 miles.

Daily discharges varied according to the needs of the powerhouse. A record of daily discharges is available from Northern Canada Power Commission at Mayo.

Colour varied from clear to dark brown and debris load ranged from slight to heavy also depending on the discharge.

Water temperatures during the study period ranged from the low to mid 40°'s at night, to highs in the low 60°'s during late afternoon.

Dissolved oxygen concentrations remained between 10 and 11 ppm and a pH of 7.5 was recorded.

### Interviews

The dam supervisor, Mr. J. Podhora, was interviewed on June 13, 1972. At this time it was learned that large daily fluctuations in discharge through the dam and powerhouse occurred. It was also learned that in the summer of each year the flow was cut off completely in order to inspect the facility. It was requested at this time that our office in Whitehorse be notified prior to any future shut downs. These conditions were reported to our office and the regional office was notified so that further action could be taken.

Mr. A. Pelland, a long time resident of Mayo and commercial fisherman, provided the following information about the area before dam construction. According to his recollection, chinook salmon were sighted in the Mayo River as far up as Mayo Lake as well as in Duncan and Davidson Creeks, both being tributaries to the Mayo River. He estimated the run of chum salmon to be in the thousands but declined to estimate the numbers of chinooks. He also reported a drastic increase in the pike populations in the Mayo area since the dam's construction.

From a conversation held with Mr. C. Wood, a local resident, it was learned that during dam shut downs local residents were known to catch stranded fish by methods which ranged from clubbing in the pools to jumping off the bridge after them. He also stated that shut downs had occurred during salmon spawning and was concerned about the effects of this practice.

*Could have checked out again if  
NCC had been recorded in past years AS*

### Other Areas Examined

July 5, 1972.

Mayo River - below Mayo Lake to Minto Bridge.

Width - 100 to 150 feet.

Composition - boulder 60%; coarse 30%, fine 9%, sand and silt 1%.

Temperature - 59°F at 10 am.

Colour - clear up to reservoir.

Discharge - 844 cfs.

Fish observed - grayling, longnose suckers and sculpins.

Obstructions - control dam, complete barrier at certain times

July 8, 1972

Duncan Creek - tributary to Mayo River  
 Width - 40 - 50 feet  
 Composition - boulder 90%, coarse 9%, fines 1%.  
 Temperature - 49°F at 1:00 pm.  
 Colour - clear.  
 Discharge - 210 cfs.  
 Fish observed - grayling.  
 Obstructions - none.

June 30, 1972.

Roop Creek - tributary of Mayo Lake - 3 miles upstream.  
 Width - 75-100 feet.  
 Composition - boulder 10%, coarse 50%, fine 30%, silt and sand 10%.  
 Temperature- 51°F at 1:00 pm.  
 Colour - clear.  
 Discharge 380 cfs.  
 Fish observed - Sculpin and grayling.  
 Obstructions - many dead falls but no major obstructions.

#### Salmon Counts

On August 26, 1972, the Mayo River was flown by helicopter to count chinook salmon. At this time 20 dead chinook salmon were sighted but no live were observed.

October 8, 1972, the Mayo River was again flown by helicopter to count chum salmon. No chums were observed at this time.



## DISCUSSION

This study has shown that the short section of river between the hydro dam and the Stewart River is frequented by at least 9 species of fresh water fish and 1 species of Pacific Salmon. Chum salmon, as well as chinook salmon have been reported to spawn in this river but were not observed during the study period. The river also appears to be used as a spawning grounds for chinook salmon, arctic grayling, northern pike, round whitefish and longnose suckers and is used extensively as a rearing area for their fry.

From conversations with local residents, it was learned that the chinook salmon spawning population has been reduced to a mere fragment of the original stocks by the dam's construction, and that damage to the total fish stocks is a continuing process due to erratic changes in daily discharges through the river bed. During the study period the daily silt and debris load, due to soil erosion, that accompanied the fluctuations in discharge posed a threat to incubating eggs in the lower one third of the river. (Fig.#4) The annual shut off of discharge at the powerhouse also sets the scene for a potential disaster, since fish become stranded in pools and overheating of the water may cause death to less heat tolerant species such as arctic grayling and whitefish. It also leaves the fish more vulnerable to abuse by humans and predators at this time.

It is hoped that through continued study of this area and through co-operation of Northern Canada Power Commission in implementing the recommendations made by the Fisheries Service that these situations can be rectified to ensure the well being of the native fish stocks.

Fig. # 3

	DATE AND LOCATION	SPECIES	WEIGHT IN gm.	LENGTH IN mm.	SEX	MATURITY	SCALES	METHOD OF CAPTURE
1	June 13, 1972 Campsite	Round Whitefish	12.5	112	?	IM	-	Seine
2	" "	Round Whitefish	18.5	132	?	IM	-	"
3	" "	Round Whitefish	12.4	120	?	IM	-	"
4	" "	Grayling	36.7	155	?	IM	-	"
5	" "	Grayling	5.1	83	?	IM	-	"
6	" "	Grayling	28.0	141	?	IM	-	"
7	" "	Grayling	16.0	123	?	IM	-	"
8	" "	Grayling	17.0	158	?	IM	-	"
9	" "	Grayling	22.9	136	?	IM	-	"
10	" "	Grayling	25.5	145	?	IM	-	"
11	" "	Chinook fry	.6	39	?	IM	-	"
12	" "	Pike	85.3	220	?	IM	Bl - 1&2	Gillnet
13	" "	Burbot	20.7	150	?	IM	-	Fyke ne
14	" "	Pike	859.1	502	M	M-ripe	Bl - 3&4	Fyke ne
15	June 14, 1972 Across from Campsite	Chinook fry	0.7	42	?	IM	-	Seine
16	" "	Chinook fry	0.5	37	?	IM	-	"
17	" "	Grayling	7.1	93	?	IM	-	"
18	" "	Grayling	6.2	82	?	IM	-	"
19	" "	Grayling	12.1	105	?	IM	-	"
20	" "	Grayling	6.3	84	?	IM	-	"
21	" "	Grayling	6.3	80	?	IM	-	"
22	" "	Grayling	6.5	87	?	IM	-	"
23	" "	Grayling	6.5	85	?	IM	-	"
24	" "	Grayling	6.0	84	?	IM	-	"
25	" "	Grayling	5.9	76	?	IM	-	"
26	" "	Grayling	7.1	90	?	IM	-	"
27	" "	Grayling	3.7	75	?	IM	-	"
28	" "	Round Whitefish	8.1	105	?	IM	-	"
29	" "	Round Whitefish	14.0	122	?	IM	-	"
30	" "	Round Whitefish	5.8	92	?	IM	-	"
31	June 15, 1972 Campsite	Burbot	5.5	100	?	IM	-	Fyke net
32	" "	Burbot	4.4	92	?	IM	-	Fyke net
33	" "	Lake Chub	1.5	57	?	IM	-	Fyke net
34	Bridge	Inconnu	-	570	M	M	Bl - 5&6	Gillnet
35	" "	Longnose Sucker	507.0	360	F	M-ripe	-	2 1/2" mes "
36	" "	Longnose Sucker	336.0	325	M	M-ripe	-	"
37	" "	Longnose Sucker	618.0	413	F	M-ripe	-	"
38	June 16, 1972 1 mile down- stream from Campsite	Grayling	10.0	100	?	IM	-	Seine
39	" "	Grayling	6.0	86	?	IM	-	"

	DATE AND LOCATION	SPECIES	WEIGHT IN gm.	LENGTH IN mm.	SEX	MATURITY	SCALES	
40	Bridge June 16, 1973	Longnose Suckers	387.5	361	M	M-ripe	-	Gillnet 2½"
41	"	Round Whitefish	336.0	351	F	M	B1 - 7&8	"
42	"	Grayling	164.0	245	F	M-spawned out	B1 - 9&10	"
43	"	Grayling	210.0	273	F	M	B1 - 11&12	"
44	"	Grayling	191.5	267	M	M-spawned out	B1 - 13&14	"
45	July 18, 1972	Inconnu	433.0	335	?	M	B2 - 1&2	Seine
46	"	Grayling	325.0	310	?	M	B2 - 3&4	"
47	"	Humpback Whitefish	614.1	370	?	M	B2 - 5&6	"
48	"	Lake trout	5.4	80	?	IM	-	"
49	"	Lake trout	5.2	77	?	IM	-	"
50	"	Lake trout	5.3	78	?	IM	-	"
51	"	Lake trout	5.0	77	?	IM	-	"
52	"	Chinook fry	0.9	40	?	IM	-	"
53	"	Chinook fry	0.8	39	?	IM	-	"
54	"	Grayling	425.2	350	M	M	B2 - 7&8	"
55	"	Grayling	242.0	280	?	M	B2 - 9&10	"
56	"	Grayling	6.3	90	?	IM	-	?
57	"	Lake trout	2.3	55	?	IM	-	
58	"	Lake trout	3.3	63	?	IM	-	
59	"	Chinook fry	0.6	38	?	IM	-	
60	"	Chinook fry	0.5	36	?	IM	-	
61	"	Chinook fry	0.5	37	?	IM	-	
62	"	Whitefish(?)	3.7	65	?	IM	-	
63	"	" "	1.4	50	?	IM	-	
64	"	Chinook fry	0.6	42	?	IM	-	
65	"	Chinook fry	0.7	44	?	IM	-	
66	"	Chinook fry	0.8	43	?	IM	-	
67	"	Chinook fry	0.6	39	?	IM	-	
68	"	Chinook fry	0.7	42	?	IM	-	
69	"	Chinook fry	0.4	38	?	IM	-	
70	"	Chinook fry	0.5	41	?	IM	-	
71	"	Chinook fry	0.5	41	?	IM	-	
72	"	Chinook fry	0.5	38	?	IM	-	
73	"	Chinook fry	0.3	36	?	IM	-	
74	"	Whitefish (?)	2.9	76	?	IM	-	
75	"	Chinook fry	-	-	-	-	-	50' seir
76	"	Humpback Whitefish	439.5	340	M	M	B2 - 11&12	?
77	"	Grayling	184.0	265	M	IM	B2 - 13&14	Seine
78	"	Chinook fry	1.5	52	?	?	-	
79	"	Chinook fry	1.5	50	?	?	-	
80	"	Chinook fry	1.1	45	?	?	-	
81	"	Chinook fry	1.0	45	?	?	-	

Fig. # 4 Bank erosion at Campground on Mayo River



Fig. # 5 Mayo River near Campground

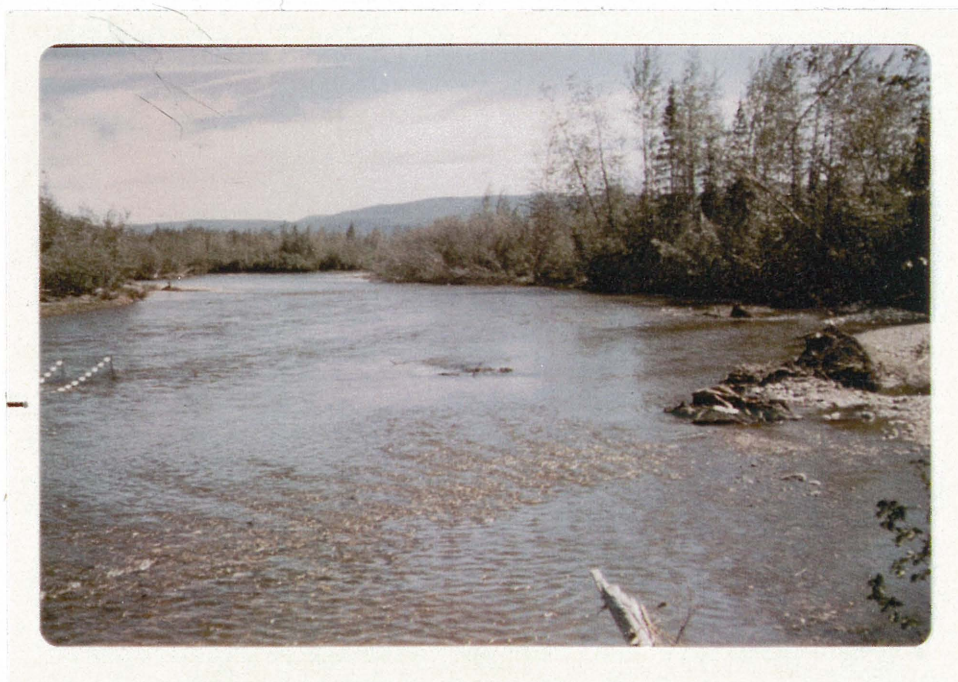




Fig. # 6

Area below Powerhouse where chinook are reported to spawn.



Fig. # 7

Dry channel between Dam and Powerhouse



## RECOMMENDATIONS

- (1) The incomplete nature of findings from this years work suggests that further studies be undertaken in the Mayo area.
- (2) Some time should be spent in the area soon after break-up in order to assess the chinook smolt migration. Scale samples should be taken in order to establish an age index for these juvenile fish.
- (3) Efforts should be made to locate important spawning grounds for chinook salmon, chum salmon, grayling, suckers and round whitefish.
- (4) Spawning counts of chinook and chum salmon should be carried out in the Mayo River below the dam.
- (5) The operation of the N.C.P.C. Dam should be observed in order to prevent actions with potentially harmful results, ie. shut off of flows and continual fluctuation of discharge.

Acknowledgement

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